Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

Hence generally $2^{2n+1}\frac{d^n}{dx^n}\{x^{n+\frac{1}{2}}\frac{d^{n+1}}{dx^{n+1}}e^{\sqrt{x}}\}=e^{\sqrt{x}}$.

Also solved by *B. F. YANNEY.*

## PROBLEMS.

70. **Proposed by J. A. CALDERHEAD, A. B., Professor of Mathematics, Curry University, Pittsburg, Pennsylvania.**

Given $\sqrt[3]{a+x}+\sqrt[3]{a-x}=\sqrt[3]{c}$ to find $x$.

71. **Proposed by F. P. MATZ, D. Sc., Ph. D., Professor of Mathematics and Astronomy in Irving College, Mechanicsburg, Pennsylvania.**

When $x=0$, find the the limit of the expression

$$U=\left(\frac{m+x}{m-x}\right)^{\frac{1}{x}}+\left(\frac{m-x}{m+x}\right)^{\frac{1}{x}}.$$

# GEOMETRY.

Conducted by B. F. FINKEL, Springfield, Mo. All contributions to this department should be sent to him.

## SOLUTIONS OF PROBLEMS.

54. **Proposed by I. J. SCHWATT, Ph. D., University of Pennsylvania, Philadelphia, Pennsylvania.**

Prove geometrically:

If through the center of perspective $D$ of a given triangle $ABC$ and its Brocard triangle $A'B'C'$ be drawn straight lines so as to pass through $S_a$, $S_b$ and $S_c$ ($S_a$, $S_b$, and $S_c$ are the middle points of the sides $BC$, $AC$, and $AB$ of the triangle $ABC$) and if $S_aA_1$ is made equal to $DS_a$, $S_bD_2$ equal to $DS_b$, and $S_cD_3$ equal to $DS_c$ then are (1) the figures $D_1O'AO$, $D_2O'BO$ and $D_3O'CO$ parallelograms ($O$ and $O'$ are Brocard's points), (2) the triangles $D_1D_2D_3$ and $ABC$ are equal, and (3) $D_1A$, $D_2B$, and $D_3C$ intersect in $S$, ($S$ is the middle point of $OO'$).

**Solution by G. B. M. ZERR, A. M., Ph. D., Professor of Mathematics and Applied Science, Texarkana College, Texarkana, Arkansas-Texas.**

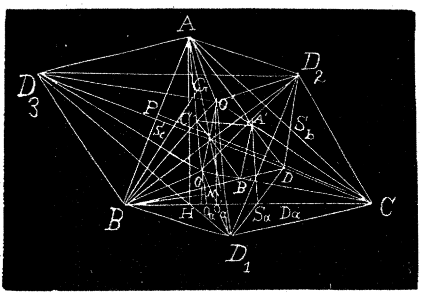
Since $AC$, $DD_2$ and $BC$, $DD_1$ bisect each other the quadrilaterals $ADCD_2$ and $BDCD_1$ are parallelograms, and $AD_2$, $BD_1$ both being equal and parallel to $DC$ are equal and parallel to each other. Hence $ABD_1D_2$ is a parallelogram and $AB$ is equal and parallel to $D_1D_2$. Similarly, $AC$ is equal and parallel to $D_1D_3$, and $BC$ is equal and parallel to $D_2D_3$.

$\therefore$ Triangle $ABC$ is equal to triangle $D_1D_2D_3$. Also $AD_1$, $BD_2$, and

$CD_3$ intersect at the same point. For $BD_2$ and $CD_3$ bisect each other, also $BD^2$ and $AD_1$ bisect each other.

$\therefore$ $BD_2$, $AD_1$, and $CD_3$ bisect one another in the same point. Since triangle $BDC$=triangle $D_3AD_2$, $DD_a$=the perpendiculer distance from $A$ to $D_2D_3$.

Draw $AH$, $OO_a$, $O'O'_a$, $DD_a$ perpendicular to $BC$; then the point of intersection of the three lines $AD_1$, $BD_2$, $CD_3$ is distant from $BC$, $\frac{1}{2}(AH-DD_a)$.



$$DD_a=\frac{2b^2c^2.\triangle}{a(a^2b^2+a^2c^2+b^2c^2)}.\quad \text{(Schwatt's Curves, p. 10).}$$

$$AH.a=2\triangle.\quad \therefore AH=\frac{2\cdot\triangle}{2a}.$$

$$\frac{AH-DD_a}{2}=\frac{\triangle.a(b^2+c^2)}{(a^2b^2+a^2c^2+b^2c^2)}=\frac{OO_a+O'O'_a}{2}.\quad \text{(Schwatt's Curves, p. 9).}$$

$\therefore$ $AD_1$, $BD_2$, $CD_3$ intersect at the mid-point of $OO'$.

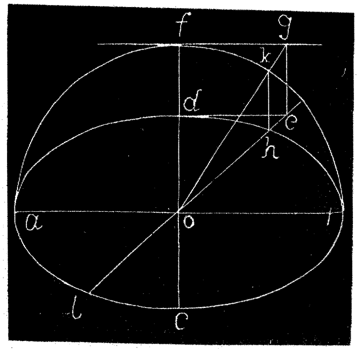
$\therefore$ Since $AD_1$, $OO'$; $BD_2$, $OO'$; $CD_3$, $OO'$ all bisect one another, the quadrilaterals $AOD_1O'$, $BOD_2O'$, $COD_3O'$ are parallelograms.

**55. Proposed by FREDERICK R. HONEY, Ph. B., New Haven, Connecticut.**

**Let *ab* and *cd* be respectively the major and minor axes of an ellipse, and let $\alpha$ be the angle which a diameter *lh* forms with the major axis; it is required to find the length of this diameter.**

**I. Solution by the PROPOSER.**

SOLUTION. Draw the semicircle *afb* on the diameter *ab*. Produce *cd* to *f*, and draw the tangents to the ellipse and the circle parallel to *ab* at the points *d* and *f* respectively. Produce *lh* to intersect *de* at *e*. Draw *eg* perpendicular to *ab* intersecting *fg* at *g*. Draw *go* intersecting the semicircle at *k*. Draw *kh* perpendicular to *ab* intersecting *oe* at *h* one extremity of the diameter *lh*.



ANALYSIS. The semiellipse *adb* may be considered as the projection on the plane of the paper of the semicircle *afb*, the latter being revolved about the diameter *ab* into a position when *f* is projected at *d*. The tangent *fg* which is parallel to *ab* is projected at *de* also parallel to *ab*. The points *e* and *h* are respectively the projections of *g* and *k*. Since the projection of every point on the